## **Support Information**



Figure S1: Representative snapshots of equilibrium morphologies of the nanotube systems at low temperature. (a-d) show the difference depending on the helix radius of LC ( $r_{LC}$ ).: (a)  $r_{LC} = 0.00$ , (b)  $r_{LC} = 0.14$ , (c)  $r_{LC} = 0.20$  and (d)  $r_{LC} = 0.25$ . (e-h) show the difference depending on the pitch of LC (p): (e) p = 0.5, (f) p = 1.0, (g) p = 1.5 and (h) p = 2.0.



Figure S2: Temperature dependence of the orientational order parameter  $P_2$  for nanotube systems in the heating (red arrows and circles) and cooling process (blue arrows and triangles). The vertical and horizontal axis show  $P_2$  and temperature *T* respectively.



Figure S3: Temperature dependence of the orientational order parameter  $P_2$  for nanotube systems in the various cooling rate. The vertical and horizontal axis show  $P_2$  and temperature T, respectively. Red line is  $P_2$  at twice the cooling rate, green line is  $P_2$  as shown in paper, and blue line is  $P_2$  at half the cooling rate. the final morphologies (insets) are nearly the same, regardless of the cooling rate.